POSITIONS/CONTROVERSIES

FOSTERING DIVERSITY THROUGH PERSONALIZED EDUCATION: IMPLICATIONS OF A NEW UNDERSTANDING OF HUMAN INTELLIGENCE[1]

Howard Gardner

In 1983, I published *Frames of mind*, an introduction to the theory of multiple intelligences (MI theory). In that book I presented an alternative to the traditional view of human intelligence. Since the publication of this book, I have become more aware, through the evolution of my own research and through the many educational developments inspired by MI theory, of the educational ramifications of this novel perspective. Given the ongoing interests and efforts to reform education systems and expand educational opportunity around the world, I will present here: the basic tenets of MI theory; outline some of the implications of those ideas for education; clarify some misinterpretations about the theory which have unfolded over time; and present a section of recent developments which may help to obtain a deeper grasp of the theory.

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MI theory in a nutshell

Since the beginning of the century, a uni-dimensional view of intelligence has prevailed among the community of psychologists. While authors such as L.L. Thurstone, J.P. Guilford and others challenged this tradition, most scholars adhered to a common view of general intelligence as a construct underlying human abilities. I propose a paradigmatic shift in our understanding of intelligence, one that challenges the uni-dimensional view and which has implications about how to organize education.

Unlike others who have preceded me in the study of intelligence, I believe that we should get away altogether from tests and correlations among tests, and look instead at more naturalistic sources of information about how peoples around the world develop skills important to their way of life. Think, for example, of sailors in the Pacific Ocean, who find their way around hundreds, or even thousands, of islands by looking at the constellations of stars in the sky, feeling the way a boat passes over the water, and noticing a few scattered landmarks. A word for intelligence in a society of these sailors would probably refer to that kind of navigational ability. Think of surgeons and engineers, hunters and fishermen, dancers and choreographers, athletes and athletic coaches, tribal chiefs and sorcerers. All of these different roles need to be taken into account if we accept the way I define intelligence—that is, as the ability to solve problems, or to fashion products, that are valued in one or more cultural or community settings. For the moment, I am saying nothing about whether there is one dimension, or more than one dimension, of intelligence; nothing about whether intelligence is inborn or developed. Instead, I emphasize the ability to solve problems and to fashion products. In my work, I seek the building blocks of the intelligences used by the aforementioned sailors and surgeons and sorcerers.

The science of this enterprise, to the extent that it exists, involves trying to discover the right description of the intelligences. What is an intelligence? To try to answer this question, I have, with my colleagues, surveyed a wide set of sources which, to my knowledge, have never been considered together before. One source is what we already know concerning the development of different kinds of skills in normal children. Another source, and a very important one, is information on the ways that these abilities break down under conditions of brain damage. When one suffers a stroke or some other kind of brain damage, various abilities can be destroyed, or spared, in isolation from other abilities. This research with brain-damaged patients yields a very powerful kind of evidence, because it seems to reflect the way the nervous system has evolved over the millennia to yield certain discrete kinds of intelligence.

My research group looks at other special populations as well: prodigies, idiot savants, autistic children, children with learning disabilities, all of whom exhibit very jagged cognitive profiles—profiles that are extremely difficult to explain in terms of a unitary view of intelligence. We examine cognition in diverse animal species and in dramatically different cultures. Finally, we consider two kinds of psychological evidence: correlations among psychological tests of the sort yielded by a careful statistical analysis of a test battery; and the results of efforts in skill training. When you train a person in skill *A*, for example, does that training transfer to skill *B*? For example, does training in mathematics enhance one's musical abilities, or vice versa?

As a result of organizing all this information, I have, to date, come up with a list of eight intelligences. These are: linguistic intelligence; logical-mathematical intelligence; spatial intelligence; musical intelligence; body-kinesthetic intelligence; interpersonal intelligence; intra-personal intelligence; and naturalistic intelligence.

Linguistic intelligence is the kind of ability exhibited in its fullest form by poets. *Logical-mathematical intelligence*, as the name implies, is logical and mathematical ability, as well as scientific ability. Jean Piaget, the great developmental psychologist, thought he was studying all intelligence, but I believe he was primarily studying the development of logical-mathematical intelligence. I do not think that linguistic and logical-mathematical intelligences are the most important; on the contrary, I think all eight intelligences have equal claim to priority. In the United States of America, however, we have put linguistic and logical-mathematical intelligences, figuratively speaking, on a pedestal. Much of our testing is based on this high valuation of verbal and mathematical skills. If you do well in language and logic, you should do well in IQ (intelligence quotient) tests and scholastic aptitude tests (SATs), and you may well be accepted into a prestigious college, but whether you do well once you leave is probably going to depend as much on the extent to which you possess and use the other intelligences, and it is to those that I want to give equal attention. Daniel Goleman's recent best-seller, *Emotional intelligence*, makes the same argument.

Spatial intelligence is the ability to form a mental model of a spatial world and to be able to manoeuvre and operate using that model. Sailors, engineers, surgeons, sculptors and painters, to name just a few examples, all have highly developed spatial intelligence. *Musical intelligence* is the fourth category of ability we have identified: Leonard Bernstein had lots of it; Mozart, presumably, had even more. *Bodily-kinesthetic intelligence* is the ability to solve problems or to fashion products using one's whole body, or parts of the body. Dancers, athletes, surgeons and craftspeople all exhibit highly developed bodily-kinesthetic intelligence.

I propose two forms of *personal intelligence*—not well understood, elusive to study, but immensely important. *Interpersonal intelligence* is the ability to understand other people: what motivates them, how they work, how to work co-operatively with them. Successful salespeople, politicians, teachers, clinicians and religious leaders are all likely to be individuals with high degrees of interpersonal intelligence. *Intra-personal intelligence*, a seventh kind of intelligence, is a correlative ability, turned inward. It is a capacity to form an accurate, veridical model of oneself and to be able to use that model to operate effectively in life.

Finally, there is the *intelligence of the naturalist*.[2] The individual who is able readily to recognize flora and fauna, to make other consequential distinctions in the natural world and to use this ability productively (in hunting, in farming, in biological science) is exercising an important intelligence. Individuals like Charles Darwin or E.O. Wilson embody the naturalist's intelligence and, in our consuming culture, youngsters exploit their naturalist's intelligence as they make acute discriminations among cars, sneakers or hairstyles.

These, then, are the eight intelligences that we have uncovered and described in our research. This is a preliminary list; obviously each form of intelligence can be subdivided, or the list can be rearranged. The real point here is to make the case for the plurality of intellect. Also, we believe that individuals may differ in the particular intelligence profiles with which they are born, and they certainly differ in the profiles that they ultimately possess. I think of these intelligences as raw, biological potentials, which can be seen in pure form only in individuals who are, in the technical sense, freaks. In almost everybody else, the intelligences work together to solve problems, to yield various kinds of cultural end-states—vocations, avocations and the like.

Educational ramifications of MI theory

The uni-dimensional view of intelligence which MI theory challenged underlies a particular way of organizing schooling—a uniform view. In the *uniform school*, there is a core curriculum, a set of facts, concepts and disciplinary skills that everybody should know, and very few elective subjects. The better students, perhaps those with higher IQs, are allowed to take courses that call upon critical reading, calculation and thinking skills. In the 'uniform school', there are regular assessments, using paper and pencil instruments, of the IQ or SAT variety.[3] They yield reliable rankings of people; the best and the brightest get into the better colleges, and perhaps—but only perhaps—they will also get better rankings in life. There is no question that this approach works well for certain people—schools such as Harvard are eloquent testimony to that. Since this measurement and selection system is clearly meritocratic in certain respects, it has something to recommend it.

The alternative view of intelligence presented by MI theory leads to a very different view of the school. This pluralistic view of mind, recognizing many different and discrete facets of cognition, acknowledging that people have different cognitive strengths and contrasting cognitive styles, leads to a view of an individual-centred school. This model for a school is based in part on findings from sciences that did not even exist in Binet's time:[4] cognitive sciences (the study of the mind) and neuroscience (the study of the brain).

In my view, the purpose of school should be to develop intelligences and to help people reach vocational and avocational goals that are appropriate to their particular spectrum of intelligences. People who are helped to do so, I believe, feel more engaged and competent, and are therefore more inclined to serve society in a constructive way.

This view leads to the notion of an *individual-centred school*, one geared to optimal understanding and development of each student's cognitive profile. This vision stands in direct contrast to that of the 'uniform school' I mentioned above.

The design of my ideal school of the future is based upon two assumptions. The first is that not all people have the same interests and abilities; not all of us learn in the same way. (And we now have the technological tools to begin to address these individual differences in school.)

The second assumption is one that hurts: it is the assumption that nowadays no one person can learn everything there is to learn. We would all like, as Renaissance men and women, to know everything, or at least to believe in the potential of knowing everything, but that ideal is clearly not possible anymore. Choice is therefore inevitable, and one of the things that I want to argue is that the choices we make for ourselves, and for the people who are under our charge, might as well be informed choices. An individual-centred school would be rich in assessment of individual abilities and proclivities. It would seek to match individuals not only to curricular areas, but also to particular ways of teaching those subjects. And, after the first few grades, the school would also seek to match individuals with the various kinds of life and work options that are available in their culture.

I want to propose a new set of roles for educators that might make this vision a reality. First of all, we might have what I will call 'assessment specialists'. The job of these people would be to try to understand as sensitively and comprehensively as possible the abilities and interests of the students in a school. It would be very important, however, that the assessment specialists use 'intelligence-fair' instruments. We want to be able to look specifically and directly at spatial abilities, at personal abilities and the like, and not through the usual lenses of the linguistic and logical-mathematical intelligences. Up until now, nearly all assessment has depended indirectly on measurement of those abilities; if students are not strong in those two areas, their abilities in other areas may be obscured. Once we begin to try to assess other kinds of intelligences directly, I am confident that particular students will reveal strengths in quite different areas, and the notion of general brightness will disappear or become greatly attenuated.

In addition to the assessment specialist, the school of the future might have the 'student/curriculum broker.' It would be his or her job to help match students' profiles, goals and interests to particular curricula and to particular styles of learning. Incidentally, I think that the new interactive technologies offer considerable promise in this area: it will probably be much easier in the future for 'brokers' to match individual students to ways of learning that prove comfortable for them.

There should also be, I think, a 'school/community broker,' who would match students to learning opportunities in the wider community. It would be this person's job to find situations in the community, particularly options not available in the school, for children who exhibit unusual cognitive profiles. I have in mind apprenticeships, mentorships, internships in organizations, 'big brothers', 'big sisters'—individuals and organizations with whom these students might work to secure a feeling for different kinds of vocational and avocational roles in the society.

I am not worried about those occasional youngsters who are good at everything. They are going to succeed in any case. I am concerned about those who do not shine on the standardized tests and who, therefore, tend to be written off as not having gifts of any kind. It seems to me that the school/community broker could spot these youngsters and find placements in the community that provide chances for them to shine.

There is ample room in this vision for teachers as well, and also for master teachers. In my view, teachers would be freed to do what they are supposed to do, which is to teach their subject matter, in their preferred style of teaching. The job of master teacher would be very demanding. It would involve, first of all, supervising the novice teachers and guiding them; but the master teacher would also seek to ensure that the complex student/assessment/curriculum/community equation is balanced appropriately. If the equation is seriously imbalanced, master teachers would intervene and suggest ways to make things better.

Clearly, what I am describing is a tall order; it might even be called utopian. And there is a major risk to this programme, of which I am well aware. That is the risk of premature billeting—of saying, 'Well, Johnny is 4. He seems to be musical, so we are going to send him to the conservatoire and drop everything else.' There is, however, nothing inherent in the approach that I have described that demands this early over-determination—quite the contrary. It seems to me that early identification of strengths can be very helpful in indicating the kinds of experiences from which children might profit; but early identification of weaknesses can be equally important. If a weakness is identified early, there is a chance of attending to it before it is too late, and to come up with alternative ways of teaching or of covering an important skill area.

We now have the technological and the human resources to implement such an individual-centred school. Achieving it is a question of will, including the will to withstand the current enormous pressures toward uniformity and uni-dimensional assessments. There are strong pressures now, which you read about every day in the newspapers, to compare students, to compare teachers, regions, even entire countries, using one dimension or criterion, a kind of crypto-IQ assessment. Clearly, everything I have stated here stands in opposition to that particular view of the world. Indeed, that is my intent—to provide a ringing indictment of such one-track thinking.

I believe that there is not a single educational approach which would follow from MI theory.[5] MI theory is in no way an educational prescription. There is always a gulf between psychological claims about how the mind works, and educational practices; and such a gulf is especially apparent in a theory that was developed without specific educational goals in mind. Thus, in educational discussions, I have always taken the position that educators are in the best position to determine the uses to which MI theory can and should be put.

Indeed, contrary to much that has been written, MI theory does *not* incorporate a 'position' on tracking, gifted education, interdisciplinary curricula, the organization of the school day, length of the school year, or many other 'hot' educational issues. I have tried to encourage certain 'applied MI efforts', but in general my advice has echoed the traditional Chinese adage: 'Let a hundred flowers bloom'. And often I have been surprised and delighted by the fragrance of some of these fledgling plants—for example, the use of a 'multiple intelligences curriculum' in order to facilitate communication among youngsters drawn from different cultures; or the conveying of pivotal principles in biology or social studies through a dramatic performance designed and staged by students.

I have become convinced, however, that, while there is no 'right way' to conduct a multiple intelligences education, some current efforts go against the spirit of my formulation and embody one or more myths. Let me mention a few applications that have jarred me:

- The attempt to teach all concepts or subjects using all the intelligences. As I indicate below, most topics can be powerfully approached in a number of ways. But there is no point in assuming that every topic can be effectively approached in at least eight ways, and it is a waste of effort and time to attempt to do this.
- The belief that it suffices, in and of itself, just to go through the motions of exercising a certain intelligence. Thus, I have seen classes in which children are encouraged to wave their arms, or to run around, on the assumption that exercising one's body represents in itself some kind of MI statement. You should not understand that

I am saying that exercise is a bad thing: it is not. But random muscular movements have nothing to do with the cultivation of the mind—or even of the body!

- The use of materials associated with an intelligence used as background. In some classes, children are encouraged to read or to carry out math exercises, while music is playing in the background. Now, I myself like to work with music in the background. But unless I focus on the performance (in which case the composition is no longer serving as background), the music's function is unlikely to be different from that of a dripping tap or a humming fan.
- The use of intelligences primarily as mnemonic devices. It may well be the case that it is easier to remember a list if one sings it, or even if one dances while reciting it. I have nothing against such aids to memory. However, these uses of the materials of an intelligence are essentially trivial. What is not trivial—as I argue below—is to think musically, or to draw on some of the structural aspects of music in order to illuminate concepts such as biological evolution or historical cycles.
- The conflating of intelligences with other desiderata. This practice is particularly notorious when it comes to the personal intelligences. Interpersonal intelligence has to do with understanding other people—but it is often distorted as a license for co-operative learning or applied to extrovert individuals. Intra-personal intelligence has to do with understanding oneself—but it is often distorted as a rationale for self-esteem programmes or applied to individuals who are loners or introverted. One receives the strong impression that individuals who use the terms in this promiscuous way have never read my own writings on intelligence.
- The direct evaluation (or even grading) of intelligences, without regard to context or content. Intelligences ought to be seen at work when individuals are carrying out productive activities that are valued in a culture. And that, in general, is how reporting of learning and mastery should take place. I see little point in grading individuals in terms of how 'linguistic' or how 'bodily-kinesthetic' they are; such a practice is likely to introduce a new and unnecessary form of tracking and labelling. As a parent (or as a supporter of education who resides in the community), I am interested in the *uses* to which children's intelligences are put; reporting should have this focus. Note that it is reasonable, for certain purposes, to indicate that a child seems to have a relative strength in one intelligence and a relative weakness in another. However, these descriptions should be mobilized in order to help students perform better in meaningful activities and perhaps even to show that a labelling was premature or erroneous.

Having illustrated some problematic applications of MI theory, let me now indicate three more positive ways in which MI can be—and has been—used in the schools:

1. *The cultivation of desired end-states.* Schools should cultivate those skills and capacities that are valued in the community and in the broader society. Some of these desired roles are likely to highlight specific intelligences, including ones that have usually been given short shrift in the schools. If, say, the community believes that children should be able to perform on a musical instrument, then the cultivation of musical intelligence toward that end becomes a value of the school. Similarly, emphasis on such end-states as taking into account the feelings of others, being able to plan one's

own life in a reflective manner, or being able to find one's way around an unfamiliar terrain are likely to result in an emphasis on the cultivation of interpersonal, intrapersonal and spatial intelligences, respectively.

2. *Approaching a concept, subject matter, or discipline in a variety of ways.* Along with many other school reformers of the day, I am convinced that schools attempt to cover far too much material, and that superficial understandings (or non-understandings) are the inevitable result. It makes far more sense to spend a significant amount of time on key concepts, generative ideas, essential questions, and allow students to become thoroughly familiar with these notions and their implications.

   Once the decision has been made to dedicate time to particular items, it then becomes possible to approach those topics or notions in a variety of ways. Not necessarily in eight, let alone eighty ways, but in a number of ways that prove pedagogically appropriate for the topic at hand. Here is where multiple intelligences comes in. As I argue in *The unschooled mind*,[6] nearly every topic can be approached in a variety of ways, ranging from the telling of a story, through a formal argument, to an artistic exploration, to some kind of 'hands-on' experiment or simulation. Such pluralistic approaches should be encouraged.

   When a topic has been approached from a number of perspectives, three desirable outcomes ensue. First of all, because children do not all learn in the same way, more children will be reached—I term this desirable state-of-affairs 'multiple windows leading into the same room'. Second, students secure a sense of what it is like to be an expert when they behold that a teacher can represent knowledge in a number of different ways, and that they themselves are also capable of more than a single representation of a specified content. Finally, since understanding can also be demonstrated in more than one way, a pluralistic approach opens up the possibility that students can demonstrate *their* new understandings—as well as their continuing difficulties—in ways that are comfortable for them and accessible to others.

   Performance-based examinations and exhibitions are tailor-made for bringing to the fore a student's multiple intelligences.

3. *The personalization of education.* Without a doubt, one of the reasons that MI theory has attracted attention in the educational community is because of its ringing endorsement of an ensemble of propositions: we are not all the same; we do not all have the same kinds of minds; education works most effectively for most individuals if these differences in mentation and strengths are taken into account rather than denied or ignored. I have always believed that the heart of the MI perspective—in theory and in practice—inheres in taking extremely seriously the differences among human beings. At the theoretical level, one acknowledges that all individuals cannot be profitably arrayed on a single intellectual dimension. At the practical level, one acknowledges that any uniform educational approach is likely to serve only a minority of children.

   When I visit an 'MI school,' I look for evidence of personalization: evidence that all involved in the educational encounter take such differences among human beings extremely seriously; evidence that they construct curricula, pedagogy and assessment insofar as possible in the light of these differences. All the MI posters, indeed all the references to me personally, prove of little avail if the youngsters continue to be treated in a homogenized fashion. By the same token, whether or not members of the staff have even heard of MI theory, I would be happy to send my children to a school with the following characteristics: differences among youngsters are taken seriously; knowledge about differences is shared with children and parents; children gradually assume responsibility for their own learning; and materials that are worth knowing are presented in ways that afford each child the maximum opportunity to master those materials and to show others (and themselves) what they have learned and understood.

Clearing up some misconceptions about MI theory

In the fourteen years since *Frames of mind* was published, I have heard, read and seen several hundred different interpretations of what MI theory is and how it can be applied in the schools.[7] Until now, I have been content to let MI theory take on a life of its own. As I saw it, I had issued an 'ensemble of ideas' to the outer world, and I was inclined to let them fend for themselves. Yet, in light of my own readings and observations, I believe that the time has come for me to share my own responses to those interpretations.

In this section, I discuss seven myths that have grown up about multiple intelligences and, by putting forth seven complementary 'realities,' I attempt to set the record straight.

Myth no. 1: Now that eight intelligences have been identified, one can—and perhaps should—create eight tests and secure eight scores.

Reality no. 1: MI theory represents a critique of 'psychometrics-as-usual'. A battery of MI tests is inconsistent with the major tenets of the theory.

Comment: My concept of intelligences is an outgrowth of accumulating knowledge about the human brain and about human cultures: it is not the result of *a priori* definitions nor of factor analyses of test scores. As such, it becomes crucial that intelligences be assessed in ways that are 'intelligence-fair,' in ways that examine the intelligence directly rather than through the lens of linguistic or logical intelligence (as ordinary paper-and-pencil tests do).

Thus, if one wants to look at spatial intelligence, one should allow an individual to explore a terrain for a while and see whether he/she can find his/her way around it reliably. Or if one wants to examine musical intelligence, one should expose an individual to a new melody in a reasonably familiar idiom and see how readily the person can learn to sing it, recognize it, transform it and the like.

Assessing multiple intelligences is not a high priority in every setting. But when it is necessary or advisable to assess an individual's intelligences, it is best to do so in a comfortable setting with materials (and with cultural roles) that are familiar to that individual. These conditions are at variance with our general conception of testing, as a de-contextualized exercise using materials that are unfamiliar by design; but there is no reason in principle why an 'intelligence-fair' set of measures cannot be devised. The production of such useful tools has been our goal in such projects as Spectrum, Arts PROPEL, and Practical Intelligences for Children (PIFS).[8]

Myth no. 2: An intelligence is the same as a domain or a discipline.

Reality no. 2: An intelligence is a new kind of construct, and it should not be confused with a domain or a discipline.

Comment: I must shoulder a fair part of the blame for the propagation of this myth. In writing *Frames of mind,* I was not as careful as I should have been in distinguishing intelligences from other related concepts. As I have now come to understand, largely through my interactions with Mihaly Csikszentmihalyi and David Feldman,[9] an *intelligence* is a biological and psychological potential; that potential is capable of being realized to a greater or lesser extent as a consequence of the experiential, cultural and motivational factors that affect a person.

In contrast, a *domain* is an organized set of activities within a culture, one typically characterized by a specific symbol system and its attendant operations. Any cultural activity in which individuals participate on more than a casual basis, and in which degrees of expertise can be identified and nurtured, should be considered as a domain. Thus, physics, chess, gardening and rap music are all domains in Western culture. Any domain can be realized through the use of several intelligences: thus the domain of musical performance involves bodily-kinesthetic and personal as well as musical intelligences. By the same token, a particular intelligence, like spatial intelligence, can be put to work in a myriad of domains, ranging from sculpture to sailing to neuro-anatomical investigations.

Finally, the *field* is the set of individuals and institutions that judge the acceptability and creativity of products, fashioned by individuals (with their characteristic intelligences) within established or new domains. Judgements of quality cannot be made apart from the operation of members of a field, though it is worth noting that both the members of a field, and the criteria that they employ, can and do change over time.

Myth no. 3: An intelligence is the same as a 'learning style', 'cognitive style' or 'working style'.

Reality no. 3: The concept of *style* designates a general approach that an individual can apply equally to every conceivable content. In contrast, an *intelligence* is a capacity, with its component processes, that is geared to a specific content in the world (like musical sounds or spatial patterns).

Comment: To highlight the difference between an intelligence and a style, consider this contrast. If a person is said to have a 'reflective' or an 'intuitive' style, this designation assumes that the individual will be reflective or intuitive with all matter of content, ranging from language, to music, to social analysis. However, such an assertion reflects an empirical assumption that actually needs to be investigated. It might well be the case that an individual is reflective with music, but fails to be reflective in a domain that requires mathematical thinking; or that a person is highly intuitive in the social domain but is not in the least intuitive when it comes to mathematics or mechanics.

In my view, the relation between my concept of intelligence, and the various conceptions of style, needs to be worked out empirically, on a style-by-style basis. We cannot assume that style means the same thing to Carl Jung, Jerome Kagan, Tony Gregoric, Bernice McCarthy, and other inventors of stylistic terminology.[10] There is little authority for assuming that an individual who evinces a style in one milieu or with one content, will necessarily do so with other diverse contents—even less authority for equating styles with intelligences.

Myth no. 4: MI theory is not empirical.
(Variant of Myth no. 4: MI theory is empirical and has been disproved.)

Reality no. 4: MI theory is based wholly on empirical evidence and can be revised on the basis of new empirical findings.

Comment: Anyone who puts forth Myth no. 4 cannot have read *Frames of mind*. Literally hundreds of empirical studies were reviewed in that book, and the actual intelligences were identified and delineated on the basis of empirical findings. The seven intelligences described in *Frames of mind* (and the eighth that has recently been proposed) represent my best-faith effort to identify mental abilities of a size that could be readily discussed and critiqued.

No empirically-based theory is ever established permanently. All claims are at risk in the light of new findings. In the last several years, I have collected and reflected upon empirical evidence that is relevant to the claims of MI theory, 1983 version. Thus, work on the development in children of a 'theory of mind', as well as the study of pathologies in which an individual loses a sense of social judgement, have provided fresh evidence for the importance and independence of interpersonal intelligence.[11] In contrast, the findings of a possible link between musical and spatial thinking has caused me to reflect on the possible relations between faculties that have previously been thought to be independent.[12] Many other lines of evidence could be mentioned here: the important point is that MI theory is constantly being reconceptualized in terms of new findings from the laboratory and from the field (see also Myth no. 7).

Myth no. 5: MI theory is incompatible with 'g' (general intelligence),[13] with hereditarian accounts or with environmental (cultural) contents.

Reality no. 5: MI theory questions not the existence, but the province and explanatory power of 'g'. By the same token, MI theory is neutral on the question of heritability of specific intelligences, proposing instead the underscoring of the centrality of gene-environmental interactions.

Comment: Interest in 'g' comes chiefly from those who are probing scholastic intelligence, and those who traffic in the correlations among test scores. (Recently there have been interests in the possible neuro-physiological underpinnings of 'g';[14] and sparked by the publication of *The bell curve*,[15] interest in the possible social consequences of 'low g'). While I have been critical of much of the research in the 'g' tradition, I do not consider the study of 'g' to be scientifically improper, and I am willing to accept the utility of 'g' for certain theoretical purposes. My interest, obviously, centres on those intelligences and intellectual processes that are not covered by 'g'.[16]

While a major animating force in psychology has been the study of the heritability of intelligence(s), my inquiries have not been oriented in this direction. I do not doubt that human abilities, and human differences, have a genetic base: can any serious scientist question this at the end of the twentieth century? And I believe that behavioural genetic studies, particularly of twins reared apart, can illuminate certain issues.[17] However, along with most biologically-informed scientists, I reject the 'inherited vs. learned' dichotomy and instead stress the interaction, from the moment of conception, between genetic and environmental factors.

Myth no. 6: MI theory so broadens the notion of intelligence that it includes all psychological constructs and thus vitiates the usefulness, and the usual connotation, of the term.

Reality no. 6: This statement is simply wrong. In my view, it is the standard definition of intelligence that narrowly constricts our view, treating a certain form of scholastic performance as if it encompassed the range of human capacities and leading to disdain for those who happen not to be psychometrically bright. Moreover, I reject the distinction between talent and intelligence; in my view, what we call 'intelligence' in the vernacular, is simply a certain set of 'talents' in the linguistic and/or logical-mathematical spheres.

Comment: MI theory is about the intellect, the human mind in its cognitive aspects. I believe that a treatment in terms of a number of semi-independent intelligences presents a more sustainable conception of human thought than one that posits a single 'bell curve' of intellect.

Note, however, that MI theory makes no claims whatsoever to deal with issues beyond the intellect. MI theory is not, and does not pretend to be, about personality, will, morality, attention, motivation, and other psychological constructs. Note, as well, that multiple intelligences theory is not connected to any set of morals or values. An intelligence can be put to an ethical or an anti-social use. Poet and playwright Johann Wolfgang von Goethe and Nazi propagandist Joseph Goebbels were both masters of the German language; but how different were the uses to which they put their talents!

Myth #7: MI theory favours an unrigorous curriculum.

Comment: There is a belief that I favour an unrigorous curriculum, one that spurns the standard disciplines, hard work and regular assessment. Nothing could be further from the truth. I am actually a proponent of teaching the classical disciplines and I attempt to adhere to the highest standards, both for others and for myself. Unlike many readers, I see no incompatibility whatsoever between a belief in MI and a pursuit of a rigorous education. Rather, I feel that only if we recognize multiple intelligences can we reach more students, and give those students the opportunity to demonstrate what they have understood.

Toward a deeper grasp of the theory

In this section I state key tenets of MI theory and suggest their possible educational implications.

THE INTELLIGENCES ARE BASED ON EXPLICIT CRITERIA

What makes MI theory more than a parade of personal preferences is a set of eight criteria that were laid out explicitly in *Frames of mind*. These range from the existence of populations that feature an unusual amount of a certain intelligence (e.g. prodigies), to localization of an intelligence in particular regions of the brain, to susceptibility to encoding in a symbolic system. Of the many candidate intelligences proposed and reviewed so far (e.g. auditory or visual; humour or cooking; intuitive or moral), only eight have qualified in terms of these criteria. Those who would posit additional intelligences have the obligation to assess candidates on these criteria, and to make available the results of this evaluation.

The intelligences reflect a specific scientific wager. As I envision them, the intelligences have emerged over the millennia as a response to the environments in which humans have lived. They constitute, as it were, a cognitive record of the evolutionary past. If my list of intelligences is close to the mark, it will mean that my colleagues and I have succeeded in identifying what the brain has evolved to do—to use a current phrase, that 'we have carved nature at its proper joints'.

To be sure, culture has not evolved simply to fit nature; but the kinds of skills that we expect individuals to achieve do reflect the capacities that individuals actually possess. The challenge confronting educators is to find a way of helping individuals to employ their distinctive intellectual profiles in order to help master the tasks and disciplines needed to thrive in the society.

THE INTELLIGENCES RESPOND TO SPECIFIC CONTENT IN THE WORLD

Scientifically, an intelligence is best thought of as a 'bio-psychological construct': that is, if we understood much more than we do about the genetic and neural aspects of the human mind, we could delineate the various psychological skills and capacities that humans are capable of exhibiting. However, despite the convenient existence of the word, it makes little sense to think of intelligences in the abstract. Intelligences only come into being because the world in which we live features various contents—among them, the sounds and syntax of language, the sounds and rhythms of music, the species of nature, the other persons in our environment, and so on.

These facts lead to the most challenging implication of MI theory. If our minds respond to the actual varied contents of the world, then it does not make sense to posit the existence of 'all-purpose' faculties. There is, in the last analysis, no *generalized* memory: there is memory for language, memory for music, memory for spatial environments, and so on. Nor, despite current buzzwords, can we speak about critical or creative thinking in an unmodified way. Rather, there is critical thinking using one or more intelligences, and there is creativity in one, or in more than one, domain.

Powerful educational implications lurk here. We must be leery about claiming to enhance general abilities, like thinking or problem-solving or memory; it is important to examine *which* problem is being solved, *which* kind of information is being memorized. Even more importantly, the teacher must be wary of claims about transfer. Though transfer of skill is a proper goal for any educator, such transfer cannot be taken for granted—and especially not when such transfer is alleged to occur across intelligences. The cautious educator assumes that particular intelligences can be enhanced, but remains sceptical of the notion that use of one set of intellectual skills will necessarily enhance others.

WE CANNOT ASSESS INTELLIGENCES

Despite the seductive terminology, we cannot assess intelligences: we can at most assess proficiency in different tasks. Given the positing of multiple intelligences, there is an almost inevitable slippage towards the idea that we could assess an individual's intelligences, or profile of intelligences. And even those who recognize the limits (or inappropriateness) of standard measures, are still tempted to create some kind of a battery or milieu that 'takes the temperature' of different intelligences. I know: I have more than once succumbed to this temptation myself.

But because intelligences are the kinds of constructs that they are, it is simply not possible to assess an individual intelligence or an individual's intelligences with any degree of reliability. All that one can ever assess in psychology is performance on some kind of task. And so, if an individual does well in learning a melody and in recognizing when that melody has been embedded in harmony, we do not have the right to proclaim him/her as 'musically intelligent'; the most that we can infer is that the individual has presumptively exhibited musical intelligence on this single measure.

The greater the number of tasks sampled, the more likely it is that a statement about 'strength' or 'weakness' in an intelligence will acquire some validity. Even here, however, one must be careful. For just because it *appears* that a task was solved by the use of a particular intelligence, we cannot be certain that this is so. A person is free to solve a task in whichever manner he likes. Inferences about mind or brain mechanisms can only be made as a result of carefully designed experiments, ones that most educators (and, truth to tell, most researchers) are in no position to conduct.

For informal purposes, it is certainly acceptable to speculate that a person is relying on certain intelligences rather than others, or that he/she exhibits a strength in one but not another intelligence. However, because actual inference about intelligences is problematic, educators should be cautious about describing the intellectual profiles of students. While seven or eight labels may be preferable to one ('smart' or 'stupid'), labelling can still be pernicious, and particularly so when there is little empirical warrant for it.

THE ROAD BETWEEN THEORY AND PRACTICE RUNS IN TWO DIRECTIONS

Many individuals—practitioners as well as researchers—adopt a jaundiced view of the relation between theory and practice. On this 'conduit' view, researchers collect data and then develop theories about a topic (say, the nature of human intelligence); the implications of the theories are reasonably straightforward (e.g., let us train all intelligences equally); and practitioners consume the material and attempt to apply the theory as faithfully as possible (*voilà*—behold, a multiple intelligences classroom!).

This description is wrong in every respect. Within the research world, the relations among theory, data and inference are complex and ever-changing. Any theoretical statement or conclusion can lead to an indefinite number of possible practical implications. Only actual testing 'in the real world' will indicate which, if any, of the implications holds water. And most important, those who theorize about the human world have as much to learn from practitioners as vice versa.

Continuing the confessional mode of this essay, I freely admit that I once held a version of this mental model. While I was not initially bent on applying my theory in practical settings, I assumed that the theory would be revised in the light of further research and nothing else.

Here the events of the past decade have been most auspicious—and most enlightening. My colleagues and I have learned an enormous amount from the various practical projects that have been inspired by MI theory.

Developmental psychology and cognitive psychology confirm an important lesson: it is not possible to short-circuit the learning process. Even those with more than a nodding acquaintance with 'MI theory' need to work out their understandings in their own way and at their own pace. And if my own understanding of the theory continues to change, I can hardly expect anyone else to accept any 'reading' as conclusive—even that of the founding theorist.

Concluding thoughts

I am often asked for my views about schools that are engaged in MI efforts. The implicit question may well be: 'Aren't you upset by some of the applications that are carried out in your name?'

In truth, I do not expect that initial efforts to apply any new ideas are going to be stunning. Human experimentation is slow, difficult and filled with zigs and zags. And so I fully expect the initial applications of any set of innovative ideas will sometimes be half-hearted, superficial or even wrong-headed.

For me the crucial question concerns what has happened in a school (or class), two, three or four years after it has made a commitment to an MI approach. Often, the initiative will be long since forgotten—the fate, for better or worse, of most educational experimentation. Sometimes, the school will get stuck in a rut, repeating the same procedures of the first days, without having drawn any positive or negative lessons from this exercise. Needless to say, I am not happy with either of these outcomes.

I cherish an educational setting where discussions and applications of MI have catalyzed a more fundamental consideration of schooling: its overarching purposes, its conceptions of what a productive life will be like in the future, its pedagogical methods, and its educational outcomes, particularly in the context of the values of that specific community. Such discussions generally lead to more thoughtful schooling. Visits with other schools and more extended forms of networking among MI enthusiasts (and critics) constitute important parts of this building process. If, as a result of these discussions and experiments, a more personalized education is the outcome, I feel that the heart of MI theory has been embodied. And if this personalization is fused with a commitment to the achievement of worthwhile (and attainable) educational understandings for all children, then the basis for a powerful education has indeed been laid.

The MI endeavour is a continuing and changing one. There have emerged over the years new thoughts about the theory, new understandings and misunderstandings, and new applications—some very inspired, some less so. Especially gratifying to me has been the demonstration that this process is dynamic and interactive: no one, not even its creator, has a monopoly on MI wisdom or foolishness. Practice is enriched by theory, even as theory is transformed in the light of the fruits and frustrations of practice. The burgeoning of a community that takes MI issues seriously is not only a source of pride to me but also the best guarantor that the theory will continue to live in the years ahead.

It is of the utmost importance that we recognize and nurture all of the varied human intelligences, and all of the combinations of intelligences. We are all so different, largely because we all have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems that we face in the world. If we can mobilize the spectrum of human abilities, not only will people feel better about themselves and more competent; it is even possible that they will also feel more engaged and better able to join the rest of the world community in working for the broader good. Perhaps, if we can mobilize the full range of human intelligences and ally them to an ethical sense, we can help to increase the likelihood of our survival on this planet, and perhaps even contribute to our thriving.

Notes

1. This paper draws freely from three earlier publications by the author: Chapter 1 of *Multiple intelligences: the theory in practice,* New York, Basic Books, 1993; Reflections on multiple intelligences: myths and messages, *Phi delta kappan* (Bloomington, IN), November 1995; and Probing more deeply into the theory of multiple intelligences, *NASSP bulletin* (Reston, VA), November 1996. I am grateful to Fernando Reimers, who undertook this collation.
2. This is a more recent development in MI theory. In its original formulation, only the first seven intelligences were proposed.
3. The SAT, the scholastic aptitude test, is widely used in the United States to assess general ability in screening college applicants.
4. For a profile of Binet, see the special series 'Thinkers on education' in *Prospects,* vol. XXIII, no. 1-2, p. 101–12.
5. For a bibliography until 1992, see the Appendices to Gardner, 1993, op. cit.
6. *The unschooled mind.* New York, Basic Books, 1991.
7. See Gardner, 1993, op. cit.
8. See Gardner, 1991 and 1993, op. cit.
9. M. Csikszentmihalyi, Society, culture, and person: a systems view of creativity. *In:* R.J. Sternberg, ed. *The nature of creativity,* p. 325–29. New York, Cambridge University Press, 1988; M. Csikszentmihalyi, *On composing a creative life.* New York, HarperCollins, (in press); D.H.

Feldman, Creativity: dreams, insights, and transformations. *In:* R.J. Sternberg, ed. *The nature of creativity*, p. 271–97, op. cit.; D.H. Feldman, M. Csikszentmihalyi and H. Gardner. *Changing the world: a framework for the study of creativity*. Westport, CT, Greenwood Publishing Co., 1994.

10. For a comprehensive discussion of the notion of cognitive style, see: N. Kogan, Stylistic variation in childhood and adolescence. *In:* P. Mussen, ed. *Handbook of child psychology, vol. 3*, p. 630–706. New York, Wiley, 1983.
11. For writings pertinent to the personal intelligences, see: J. Astington, *The child's discovery of the mind*. Cambridge, MA, Harvard University Press, 1993. See also: A. Damasio, *Descartes' error*. New York, Grosset/Putnam, 1994.
12. On the possible relation between musical and spatial intelligence, see: F. Rauscher, G.L. Shaw and K.N. Ny, Music and spatial task performance. *Nature* (London), no. 365, 14 October 1993, p. 6,447.
13. The most thorough exposition of 'g' can be found in the writings of Arthur Jensen. See, for example, *Bias in mental testing*. New York, Free Press, 1980. For a critique, see Stephen J. Gould, *The mismeasure of man*, New York, Norton, 1981.
14. Interest in the neurophysiological bases of 'g' can be found in the writings of Arthur Jensen. See, for example, Why is reaction time correlated with psychometric 'g'? *Current directions of psychological science* (Cambridge, U.K.), vol. 2, no. 2, 1993, p. 53–56.
15. R. Herrnstein, and C. Murray, *The bell curve*, New York, Free Press, 1994.
16. For my view on intelligences not covered by 'g' see: H. Gardner, Cracking open the IQ box [Review of R. Herrnstein and C. Murray, *The bell curve*]. *The American prospect* (Cambridge, MA), no. 20, Winter 1995, p. 71–80.
17. On behavioural genetics and psychological research, see: T. Bouchard and P. Propping, eds., *Twins as a tool of behavioral genetics*, Chichester, U.K., Wiley, 1993.

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